

MODULAR VAULTS

General Information

- Install vault panels in accordance with the installation drawings shipped with the panels and as required by the site conditions.
- Vault panels are numbered in the recommended order of installation.
- Vault panels are of construction grade material and require proper finish treatment (3/4" plywood sub-flooring, furring strips and/or paneling for walls) by others after completion of installation.
- If for any reason the vault cannot be built as drawn, you must contact Vault Structures for any field changes.

Site Inspection

- Inspect proposed vault location to verify that the general area has free and clear access.
- Locate position of the vault on the floor and mark the perimeters per the installation drawings.
- Verify that location is square- take diagonals
- Verify that any overhead duct work, piping, lighting or other obstructions will clear the vault.
- Verify that the floor is smooth, level, of sound construction and uniform throughout.
- Verify that the pit dimensions (IF NEEDED) agree with the installation drawings.
- When required, verify that adequate shoring has been provided.

General Handling Tips

- Use wood to prevent damage to panel when hitting with a sledge.
- Before installing panels, check mating surfaces and clean or adjust as required.



INSTALLATION INSTRUCTIONS: MODULAR VAULTS

Using the Lifting Eye

1. Every concrete wall panel has a lifting eye centered in its top end.
2. The lifting device that you choose must be rated for the weight of the panel.
3. When you set panels verify the lifting device is bolted in the lifting eye securely.
4. It is recommended that the lifting device allow the panel to spin freely. (See Fig. 1)

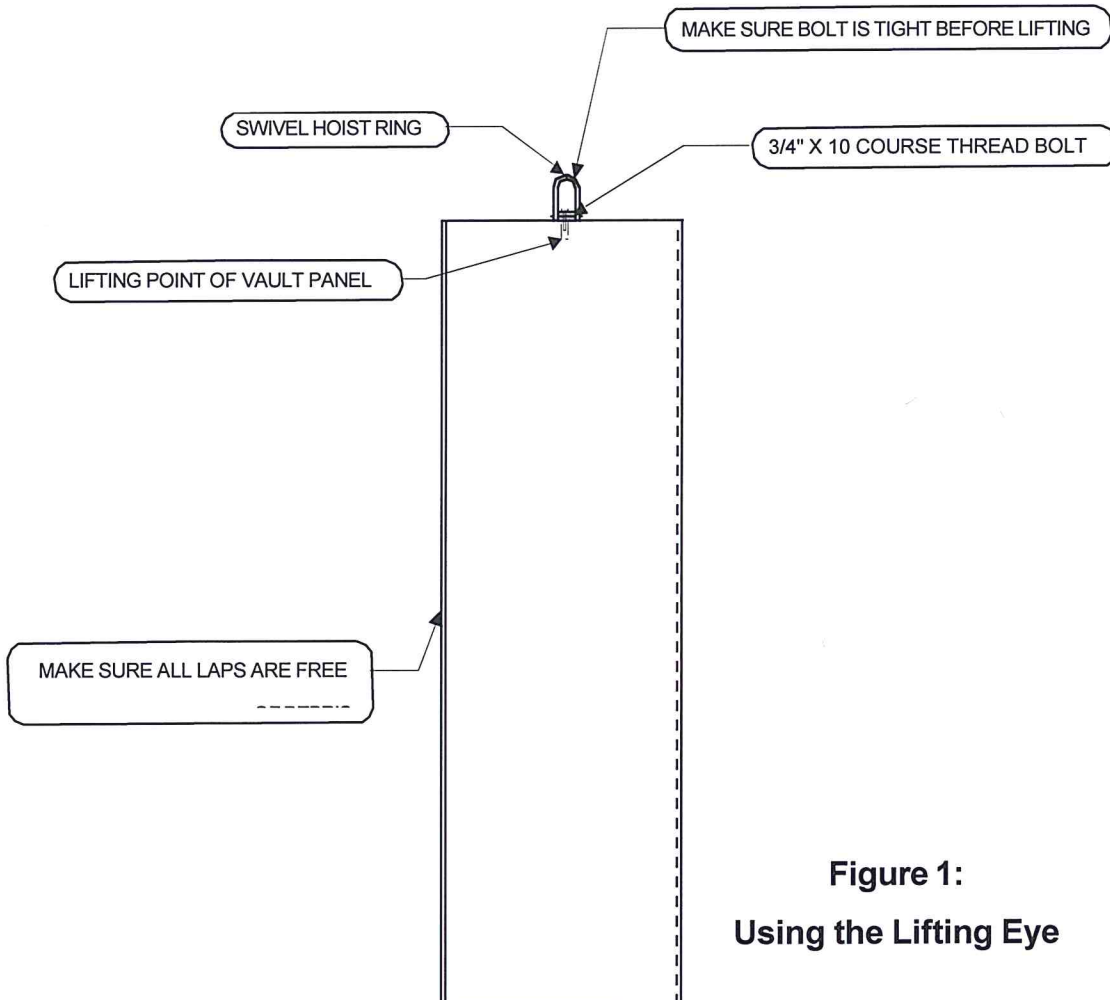


Figure 1:
Using the Lifting Eye

Off Loading & Temporary Storage of Vault Panels

1. Verify that an adequate staging area is available
2. When staging panels, be aware of support.
3. Account for all equipment. Verify panels with the installation drawings and the Bill of Lading. Verify panel numbers with installation drawings for any duplicate or missing numbers. Contact Vault Structures immediately if there are any discrepancies.
4. Stack the panels as shown. (See Figure 2). Use wood equal in size as spacers between each panel. A minimum of 3 pieces of wood should be used to stack panels, if panels exceed 9'0 then add wood as needed. Do not stack panels over four high.
5. Lightweight panels must always be tarped to protect against weather until ready to installed.

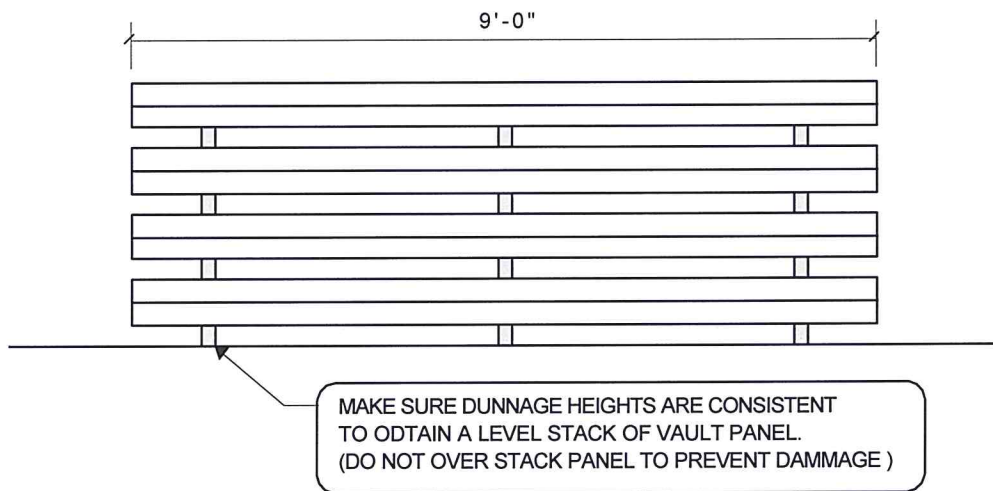
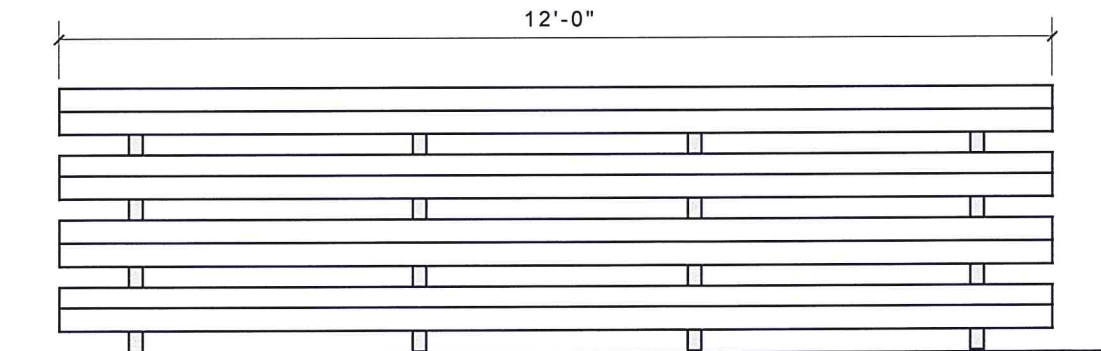


Figure 2: Typical Stacking of Vault Panels



Construction Safety Is A Must

1. Keep the work area clear of all trash and clutter.
2. Always have a fire extinguisher on hand when welding.
3. Check for smoke alarms prior to welding and grinding when working in finished areas,.
4. Inspect all tools and rigging equipment prior to each installation.
5. Never leave a standing vault panel unattended unless it has been welded, fastened or safety tied in place.
6. Use safety goggles, hard hats and appropriate protective clothing.
7. Vent fumes or smoke from confined installation areas.
8. **Don't Take Chances.**

Floor Panels

1. Align the panels with the markings that were placed on the floor starting with the front or back
2. Verify that panels will be installed with the correct surface up. Check print and verify the direction of the laps.
3. After placing three or four panels, verify that installed panels are square and adjust if necessary.
4. If the panels exceed the design dimension by 1/4" or more, gap the panels to square the floor.
5. Shim panels if necessary to maintain level floor.

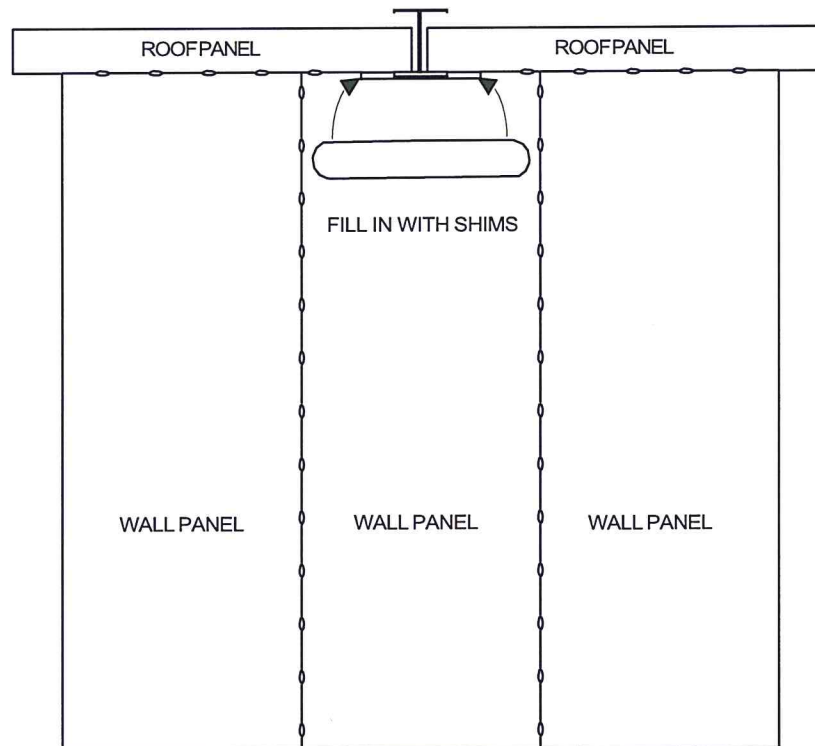
Back Wall Panels

1. Build the corner starting with the number shown on the print. Verify panel is plumb before continuing.
2. Verify length after placing three or four wall panels. Continue placing wall panels if within the design dimension.
3. If the panels exceed the design dimension by 1/4" or more, gap the panels to square.
4. Continue placing panels, verifying length throughout the installation and after placing the final panel.
5. Each panel should be tacked at the top, middle and bottom.

Internal Structural Ceiling Support:

- Whenever a vault requires an I-Beam it must be placed as shown on the installation drawings.
- Shim around beam as required to maintain a smooth transition from wall to structural steel. (See Figure 3).
- Note to installers: Shim around beam as needed to obtain proper vault panel to beam flange fit weld shims in place once beam has been properly shimmed (fill in all gaps)

Figure 3: Shim Locations



Side Wall & Ceiling Panels

Ceiling Panels Aligned Parallel to the Vault Door Opening

1. Install in conjunction with the side wall panels.
2. Install the panels in the following order:
 - a. left side wall panel.
 - b. right side wall panel.
 - c. first ceiling panel.
3. Continue to verify that the dimensions meet the specifications.
4. If the panels exceed the design dimension by 1/4" or more, gap the panels to square.
5. Continue placing panels, verifying length throughout the installation and after placing the final panel.
6. Each panel should be tacked at the top, middle and bottom.

Ceiling Panels Aligned Perpendicular to the Vault Door Opening

1. Install all the wall panels before installing the ceiling.
2. Work to the front of the vault, continue to verify that the dimensions meet the specifications.
3. If the panels exceed the design dimension by 1/4" or more, gap the panels to square.
4. Continue placing panels, verifying length throughout the installation and after placing the final panel.
5. Each panel should be tacked at the top, middle and bottom.

Welding Vault Interior and Exterior Seams

Lightweight Panels (See Figure 4)

Weld all interior and exposed exterior seams with 1" welds, spaced every 8" on center.

Caulk all exposed exterior seams as well as any interior seams with excessive gaps.

Concrete Panels (See Figure 5)

Vault Interior and Exterior Seams: Weld all interior and exposed exterior seams with 1" welds, spaced every 8" on center.

Caulk all exposed exterior seams as well as any interior seams with excessive gaps.

Suggested Tool List:

- Forklift or Crane – to move and lift panels from truck and move during installation.
- Stacker – to lift and move laminated panels during installation
- 12"C-Clamps, Pipe Clamps
- Track Jack (or Equivalent)
- One 6 foot level
- Dollies
- Grinder
- Fire Extinguisher
- Swivel Hoist Ring (for panels-see instructions on page 3 and Figure 1)
- Miscellaneous Tools (sledgehammer, pry bars, cribbing, wedges, rollers, choker chains)
- Ladders (length depends on vault height)
- Mig Welder
- Broom (for cleaning up afterward)
- Tarp (for covering laminated panels)
- Work lights
- Fans for proper ventilation
- Hammer Drill for anchoring 5 sided vaults
- Proper safety clothing (Gloves, Steel Toed Boots, Goggles, Dust Mask, Hard Hat, Non-Flammable clothing.)
- All items should comply with ANSI/OSHA standards.

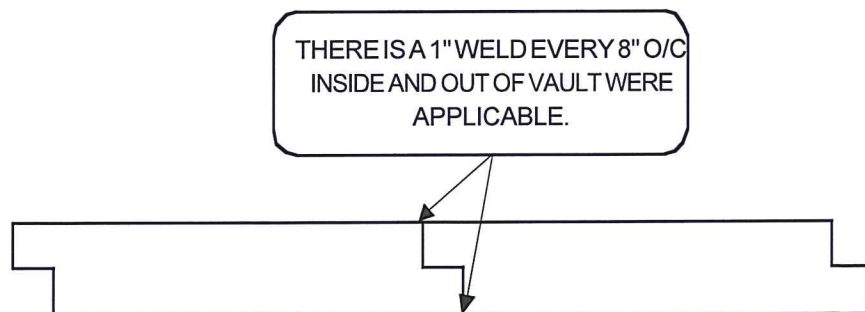
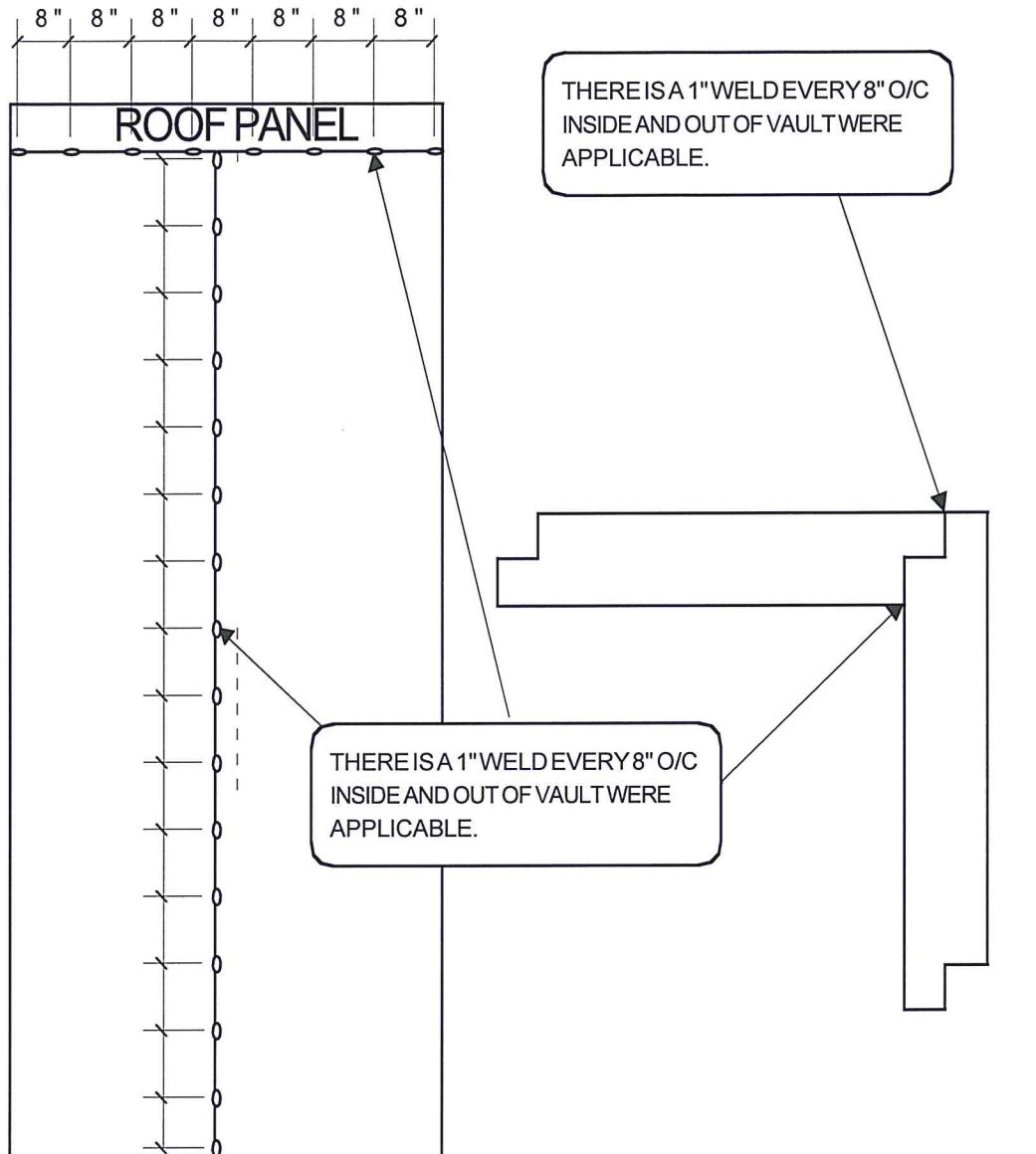


Figure 4 and 5: Welding Spec for Lightweight and Concrete Panels
Crosby Swivel Hoist Ring Warning and Applications

Hoist Ring Application Assembly Safety

- Use swivel hoist ring only with ferrous metals, (steel, iron) or soft metal (i.e. aluminum) loads (work piece). Do not leave threaded end of hoist ring in aluminum loads for long time periods due to corrosion.
- After determining the loads on each hoist ring, select the proper size hoist ring using the working Load Limit rating in Table 1 UNC threads and Table 2 for Metric threads.
- Drill and tap the work piece to the correct size to minimum depth of one-half the threaded shank diameter plus the threaded shank length.
- See rated load limit and bolt torque requirements imprinted on top of the swivel trunnion (See Table 1 and or Table 2)
- Install hoist ring to recommended torque with a torque wrench making sure the bushing flange meets the load (work piece) surface.
- Never use spacers between bushing flange and the mounting surface.
- Always select proper load rated lifting device for use with Swivel Hoist Ring.
- Attach lifting device ensuring free fit to hoist ring bail (lifting ring). (Fig. 6)
- Apply partial load and check proper rotation and alignment. There should be no interference between load (work piece) and hoist ring bail (Fig.7)
- **Special Note:** When a Hoist Ring is installed with a retention nut, the nut must have full thread engagement and must meet one of the following standards to develop the Working Load Limit (WLL).

ASTM A –563 (A) Grade D Hex Thick 2.SAE Grade 8–Standard Hex

WRONG

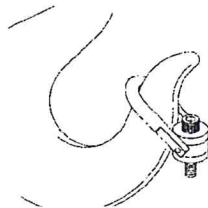


Figure 6

WRONG

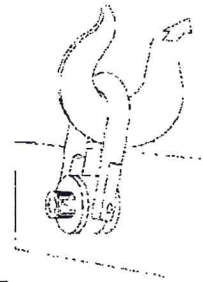


Figure 7

Warning

Loads may slip off if proper Hoist Ring Assembling and lifting procedures are not used.

A falling load may cause serious injury or death.

Use only genuine Crosby parts as replacements.

Read, understand and follow all instruction, diagrams and chart information before using swivel hoist ring assembly.

Hoist Ring Inspection/Maintenance

- Always inspect hoist ring before use.
- Regularly inspect hoist ring parts. (Fig. 8)
- Never use hoist ring that shows signs of corrosion, wear or damage. Never use hoist ring if bail is bent or elongated.
- Always be sure threads on shank and receiving holes are clean, not damaged and fit properly.
- Always check with torque wrench before using an already installed hoist ring.
- Always make sure there are no spacers (washers) used between bushing flange and the mounting surface. Re- move any spacers (washers) and retorquing before use.
- Always ensure free movement of bail. The bail should pivot 180° and swivel 360°. (Fig. 9)
- Always be sure total work piece surface in contact with hoist ring bushing mating surface. Drilled and tapped hole must be 90° to load (work piece) surface.

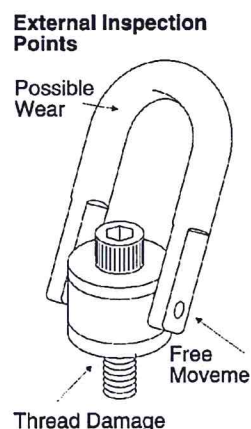


Figure 8

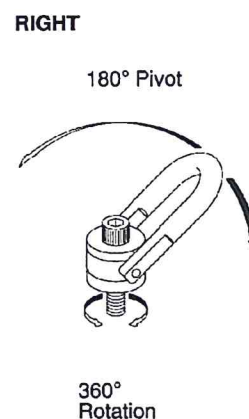


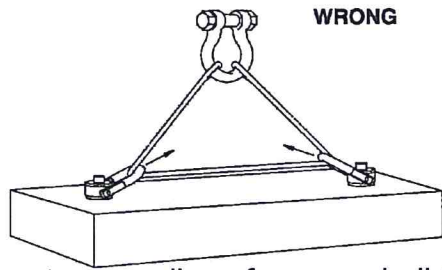
Figure 9

Operating Safety

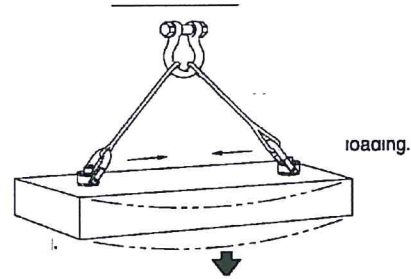
- Never exceed the capacity of the swivel hoist ring, see Table 1 for UNC threads and Table 2 for Metric threads.
- When using lifting slings of two or more legs, make sure the forces in the legs are calculated using the angle from the vertical to the leg and select the proper size swivel hoist ring to allow for the angular forces.
- **Note:** Sling angles will de-rate sling members (chain, rope or webbing) but will not de-rate swivel hoist ring capacity.

Working Load Limit (lbs.)	Torque in Ft. Lbs.	Dimensions (in.) Bolt Size A	Effective Thread Projection Length B
800	7	5/16 - 18 x 1.50	0.58
1000	12	3/8 - 16 x 1.50	0.58
2500	28	1/2 - 13 x 2.00	0.7
2500	28	1/2 - 13 x 2.50	1.2
4000	60	5/8 - 11 x 2.00	0.7
4000	60	5/8 - 11 x 2.75	1.45
5000	100	3/4 - 10 x 2.25	0.95
5000	100	3/4 - 10 x 2.75	1.45
7000 **	100	3/4 - 10 x 2.75	0.89
7000 **	100	3/4 - 10 x 3.50	1.64
8000	160	7/8 - 9 x 2.75	0.89
8000	160	7/8 - 9 x 3.50	1.64
10000	230	1 - 8 x 3.00	1.14
10000	230	1 - 8 x 4.00	2.14
15000	470	1-1/4 - 7 x 4.50	2.21
24000	800	1-1/2 - 6 x 6.50	2.97
30000	1100	2 - 4-1/2 x 6.50	2.97
50000	2100	2-1/2 - 4 x 8.0	4
75000	4300	3 - 4 x 10.5	5.2
100000	5100	3-1/2 - 4 x 13.0 #	7

* Ultimate Load is 5 times the Working Load Limit.
 ** Ultimate Load is 4.5 times the Working Load Limit for 7000# Hoist Ring when tested in 90 degree orientation.
 † Long Bolts are designed to be used with soft metal (i.e., aluminum) work piece. While the long bolts may also be used with ferrous metal (i.e., steel & iron) work piece, short bolts are designed for ferrous work pieces only.
 ‡ Bolt specification is a Grade 8 Alloy socket head cap screw to ASTM A 574.
 # Hex head bolt used on Frame 8 (100,000lb.) Hoist Ring



Do not reeve slings from one bail to another. This will alter the load and angle of loading on the hoist ring.



After slings have been properly attached to the hoise ring, apply force slowly. Watch the load and be prepared to stop applying for if the load starts buckling.

Buckling may occur if the load is not stiff enough to resist the compressive forces, which result from angular loading.

Table 2
HR-125 Metric Swivel Hoist Rings

Working Load Limit (kg)		Torque in Nm*	Dimensions (mm) Bolt Size ‡	Effective Thread Projection Length
At a 5:1 Design Factor †	At a 4:1 Design Factor †			
400	500	10	M8X1.25X40	16.7
450	550	16	M10X1.50X40	16.7
1050	1300	38	M12X1.75X50	16.9
1900	2400	81	M16X2.00X60	26.9
2150	2700	136	M20X2.50X65	31.9
3000	3750	136	M20X2.50X75	27.8
4200	5250	312	M24X3.00X80	32.8
7000	8750	637	M30X3.50X120	61.7
11000	13750	1005	M36X4.00X150	60.3
12500	15600	1005	M42X4.50X160	70.3
13500	16900	1350	M48X5.00X160	70.3

* The tightening torque values shown are based upon threads being clean, dry and free of lubrication.

† Individually proof loaded to 2-1/2 times the Working Load Limit based on the 4:1 design factor.

‡ Bolt specification is a Grade 12.9 Alloy socket head cap screw to Din 912. All threads are metric (ASME/ANSI B18.3.1m).

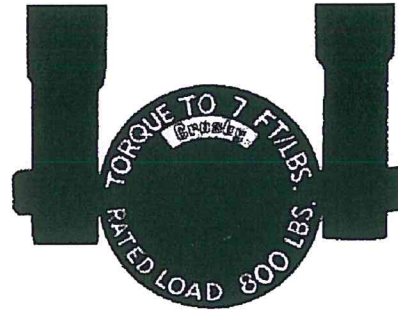
Swivel Hoist Ring

- Rated at 100% at 90 °angle.
- Each product has a Product Identification Code (PIC) for material traceability along with a Working Load Limit and the name Crosby or “CG” stamped into it.
- All components are Alloy Steel – Quenched and Tempered.
- Available in UNC and Metric thread sizes.
- UNC threads available in sizes from 800 pounds to 30,000 pounds Working Load Limit, with a design factor of 5 to 1.
- Metric threads available in sizes from 400 kg to 16,900 kg and dual rated in both a 4 to 1 and 5 to 1 design factor.
- 360° swivel and 180°pivot action.
- 100% individually proof tested to 2 1/2 times the working Load Limit with certification and Statistically Magnetic Particle inspected. (Can be furnished with 1200% Magnetic Particle inspected when requested at time of order.)
- Fatigue rated to 20,000 cycles at 1 1/2 times the Working Load Limit.
- Individually packaged along with proper application instructions and warning information.
- Bolt is secured with patented retaining ring which requires no modification to threads. This method allows for easy disassembly and assembly of hoist ring for thorough examination of all components.
- Replacement kits are available.
- Bolts are individually Proof Tested.
- Multiple bolt lengths available to meet specific application requirements.
- Color coded to distinguish between UNC (Red) and Metric (Silver) thread types. Load and Fatigue Rated. U.S. Patent 5,352,056.

Swivel Hoist Ring UNC Threads

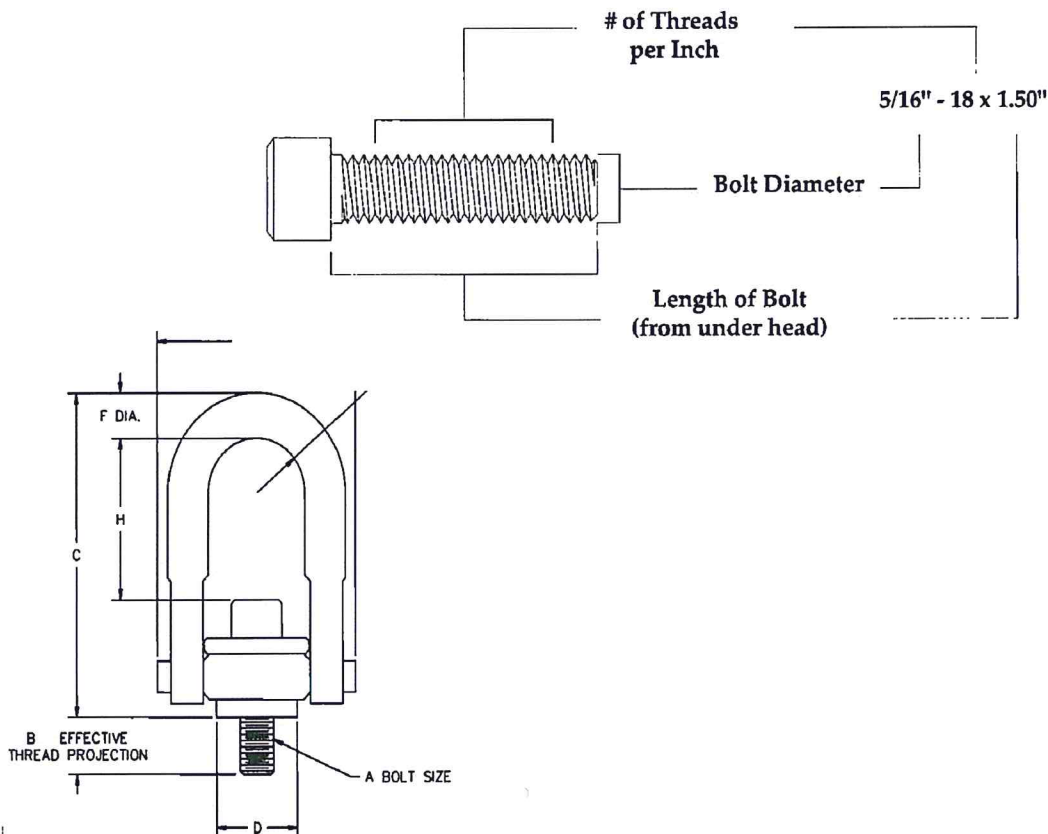
Top Washer has the following features:

- The Working Load Limit and Recommended Torque value are permanently stamped into each washer.
- Washer is color coded for easy identification. Red- UNC thread.
- **NOTE:** SEE APPLICATION AND WARNING INFORMATION ON PAGES 10-11



Bolt Size Identification

The size of the bolt will be stated as in the following example. Illustration shows meaning of each dimension given.



HR-125 UNC Threads

Frame Size No.	HR-125 Stock No.	Working Load Limit (lbs.)*	Torque in Ft. Lbs.	Dimensions (in.)								Weight Each (lbs.)
				Bolt Size A ‡	Effective Thread Projection Length B	C	D	Radius E	Diameter F	G	H	
1 †	1016887	800	7	5/16 - 18 x 1.50	.58	2.72	.97	.46	.34	1.87	1.12	.37
1 †	1016898	1000	12	3/8 - 16 x 1.50	.58	2.72	.97	.46	.34	1.87	1.05	.39
2	1016909	2500	28	1/2 - 13 x 2.00	.70	4.85	1.96	.87	.69	3.35	2.29	2.33
2 †	1016912	2500	28	1/2 - 13 x 2.50	1.20	4.85	1.96	.87	.69	3.35	2.29	2.36
2	1016920	4000	60	5/8 - 11 x 2.00	.70	4.85	1.96	.87	.69	3.35	2.16	2.41
2 †	1016924	4000	60	5/8 - 11 x 2.75	1.45	4.85	1.96	.87	.69	3.35	2.16	2.47
2	1016931	5000	100	3/4 - 10 x 2.25	.95	4.85	1.96	.87	.69	3.35	2.04	2.52
2 †	1016935	5000	100	3/4 - 10 x 2.75	1.45	4.85	1.96	.87	.69	3.35	2.04	2.59
3	1016942	7000 **	100	3/4 - 10 x 2.75	.89	6.57	2.96	1.36	.94	4.87	2.97	6.72
3 †	1016946	7000 **	100	3/4 - 10 x 3.50	1.64	6.57	2.96	1.36	.94	4.87	2.97	6.81
3	1016953	8000	160	7/8 - 9 x 2.75	.89	6.57	2.96	1.36	.94	4.87	2.84	6.84
3 †	1016957	8000	160	7/8 - 9 x 3.50	1.64	6.57	2.96	1.36	.94	4.87	2.84	6.96
3	1016964	10000	230	1 - 8 x 3.00	1.14	6.57	2.96	1.36	.94	4.87	2.72	7.09
3 †	1016969	10000	230	1 - 8 x 4.00	2.14	6.57	2.96	1.36	.94	4.87	2.72	7.31
4	1016975	15000	470	1-1/4 - 7 x 4.50	2.21	8.72	3.71	1.75	1.19	6.18	3.93	14.51
5	1016986	24000	800	1-1/2 - 6 x 6.50	2.97	12.42	4.71	2.39	1.75	8.48	5.64	37.73
5	1016997	30000	1100	2 - 4-1/2 x 6.50	2.97	12.42	4.71	2.39	1.75	8.48	5.14	40.69
6	1017001	50000	2100	2-1/2 - 4 x 8.0	4.00	16.88	5.75	3.00	2.25	11.67	8.03	88.00
7	1017005	75000	4300	3 - 4 x 10.5	5.20	19.50	7.25	3.75	2.75	14.16	8.50	165.00
8	1017009	100000	5100	3-1/2 - 4 x 13.0 #	7.00	22.09	7.75	4.00	3.25	15.91	9.28	240.00

*Ultimate Load is 5 times the Working Load Limit.

** Ultimate Load is 4.5 times the Working Load Limit for 7000# Hoist Ring when tested in 90 degree orientation.

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